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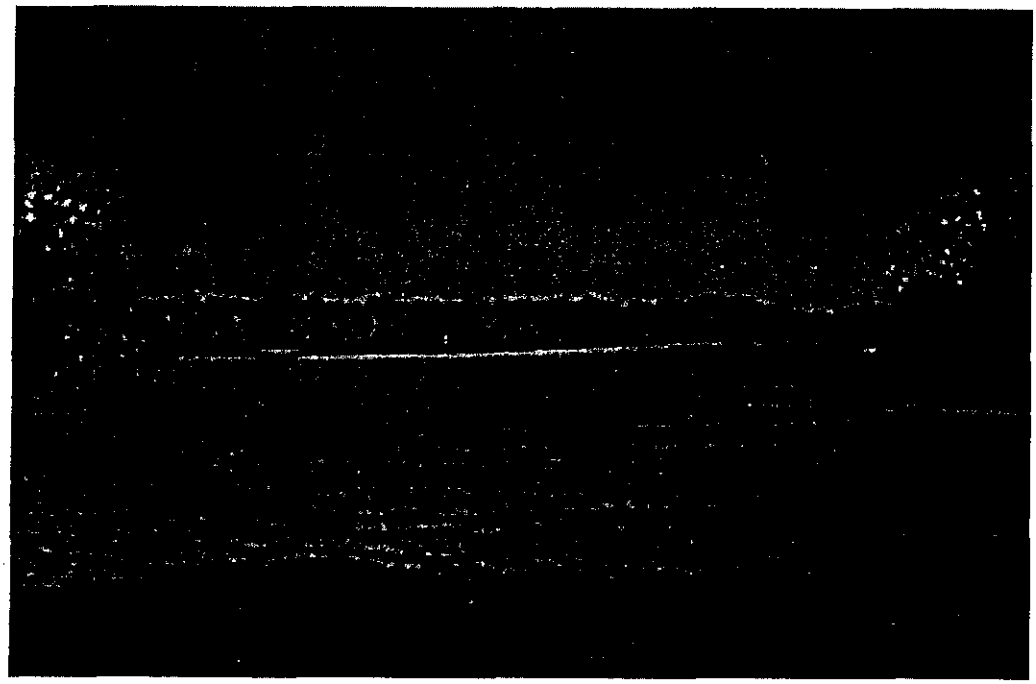
LINE 9A TRANSMISSION LINE ROUTING STUDY



Final Study Report

September, 2003

Prepared for:

City of Tallahassee Electric Utility

Prepared by:

EEC in Association with EDAW, Inc

Released 11-14-03

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Introduction

This report documents the process and results of a transmission line siting study conducted by Exponential Engineering Company (EEC) and EDAW Inc. for the City of Tallahassee (City). The transmission line under study is known as Line 9A. It would connect an existing substation (BP-9) near the intersection of Capital Circle SE and Apalachee Parkway (Highway 27) with a proposed substation (BP-17) just off Mahan Drive at Mystic Warrior Trail.

The purpose of this line and the new substation is to reinforce an overextended distribution system in the rapidly-growing east and northeast parts of the City and adjacent portions of Leon County. Because of the rapid urbanization in this area, identifying a suitable route presents a real challenge. Prior to this study, the City had already identified Route A as a potential route and began work on it. However, given that many individuals and agencies within the community regard Mahan Drive as an important gateway into the City, the City felt the need to explore other options. The City recognized that this line would be a new visual impact requiring the cutting and trimming of a large number of live oak trees along this thoroughfare. Hence this study was initiated.

Because of the sensitivities that occur throughout the area, a study was undertaken to comprehensively and systematically identify and evaluate suitable alternative routes within a study area generally extending from Mahan Drive on the north to Apalachee Parkway on the south, and from Capital Circle on the west to Chaires Crossroad on the east.

The study was conducted from June 2002 to June 2003. This report is a documentation of that study and its results.

Study Approach

A systematic approach was developed to guide the study process. The approach initially consisted of sequential tasks aimed at investigating the potential for alternative routes within the study area, a public meeting to review the results of this investigation and an interim study report. This was then followed by a second phase of work aimed at the development and evaluation of alternative routes.

The tasks involved in the study are briefly described as follows.

Task 1 – Study Initiation

The first task in the study was an initial coordination meeting between EEC/EDAW and City project managers and staff. The overall objective of this meeting was to review and discuss background information, including:

- Further definition and discussion regarding project objectives and electrical system needs.
- Further discussion of the work conducted to date, particularly the analysis and assumptions developed in the previous routing efforts.

- Review of any land use and resource information used in the studies conducted to date and/or the availability of any such information.
- Review of proposed structure types and heights, right-of-way needs, standard methods of construction, etc.
- Identification of city, county and state agencies with jurisdictional responsibilities relative to this project, a summary of their authority/responsibilities, and their involvement in the project to date.
- Discussion and coordination of initial steps in the public involvement program.
- Review and discussion of the study schedule and significant milestones within the overall schedule.
- Development of base map and data mapping.
- Contact and coordination protocols.

Following the kickoff meeting, EEC/EDAW and City managers and appropriate staff toured the study area, noting routing issues (constraints and opportunities) that were present.

Based on the initial results of the field reconnaissance and an understanding of the purpose, need and system requirements, project study area boundaries were developed. Within this area, an intensive data collection effort was undertaken to collect existing, relevant information.

Task 2 – Data Collection

Data collection was initially directed toward sources of existing information. Agencies are one of the best sources for the collection of existing data. Among the principal agencies contacted were the Florida Department of Environmental Protection, Florida Fish and Wildlife Conservation Commission, Natural Resource Conservation Service, U.S. and Florida Geologic Surveys, State Historic Preservation Office, Tallahassee and Leon County Planning Departments, and the Florida Natural Areas Program.

The data collected was compiled into a series of GIS data maps and analyzed. The results of this task were a series of digital base maps depicting environmental and land use information within the defined study area.

The resource data collected, along with agency policies and other guidelines, were reviewed to develop constraint/opportunity conditions. Based on the results of the constraint/opportunity analysis and a full understanding of the electrical system needs, all reasonable routing alternatives were preliminarily identified.

Task 3 – Public Workshop

EEC/EDAW then assisted the City in the development and implementation of a public involvement program. The objectives of the public involvement program included:

- Informing the public and agencies about the project as well as opportunities for participation.
- Assuring that public and agency concerns were reflected in the study process.

- Alerting the project team to significant conflicts and providing mechanisms for resolving them.
- Meeting all legal requirements for consultation.

In order to accomplish these objectives, various meetings were conducted, including briefing meetings with agencies along with a public workshop that was held in an open house format. The workshop format and agenda were developed to provide an informal, non-adversarial environment in which information and viewpoints could be freely exchanged. Information collected and mapped prior to the workshop was presented to facilitate informed public comment and discussion. Participants were able to move freely among the various exhibits and stations, visiting with project representatives and providing both formal and informal input.

The primary messages communicated were:

- There is a convincing case for the purpose and need for this line.
- The City is genuinely interested in public and agency concerns.
- The City is genuinely interested in minimizing the adverse impacts of the line.

Task 4 – Interim Study Report

Following the workshop, EEC/EDAW summarized the results of the workshop, highlighting the remaining issues that should be addressed; and prepared a report containing a documentation of the study process, analysis and results (EEC, EDAW 2002). This report recommended subsequent studies to more formally develop a network of alternative routes and gather the data for their comparative evaluation.

A final report was prepared following input and review from the City. The recommendations regarding additional study were refined over time and a second phase of work was subsequently initiated.

Task 5 - Develop Preliminary Alternatives

The objective of this task was to formally establish a network of alternative routes. The first step was to review the data collected to date in light of the input received at the first public meeting. This, combined with additional site reconnaissance, resulted in the development of a network of alternative routes that included all feasible options within the study area.

At the outset, a meeting was held with the City project manager and appropriate other staff to review the preliminary network of alternative routes. Changes made as a result of the incorporation of public input were reviewed and a joint determination made regarding the configuration of the preliminary network of alternative routes.

A draft set of route evaluation criteria was also reviewed at this meeting. Because these criteria would be the basis for first determining the nature and degree of field investigation, and secondly, to rank and compare alternatives, it was important that they be given adequate discussion before initiating further work.

A comprehensive discussion was also initiated regarding the issue of undergrounding with respect to the assessment of land use and environmental impacts. The engineering considerations of underground construction to be used in the assessment of impacts were also discussed and reviewed with the City at this time.

EEC worked with the City to provide the technical engineering expertise to establish the parameters necessary for an accurate assessment of land use and environmental impacts of an underground 115-kV line. This effort was implemented in concert with an independent study contracted by the City regarding the comparative costs of underground construction.

Task 6 – Field Inventory and Alternative Route Refinement

The objective of this task was to collect the information needed to rank and compare alternatives in an objective and defensible way. As this data was gathered and additional information becomes known, route refinements were made where feasible and practical to reduce site-specific impacts to the greatest extent possible.

The data collection effort also included the necessary information to document and assess underground impacts. The perception is that if a transmission line is underground, it is benign in all respects. The fact is that there are substantial land use and environmental impacts associated with an underground line that are not recognized by the public. The collection of this information took place along with the collection of the information needed to assess overhead impacts.

The nature and extent of land use and environmental factors important to the public and reviewing/permitting agencies were included as evaluation criteria, and were inventoried along each of the alternative routes. This information was documented on maps and aerial photos as well as field forms where appropriate.

EEC/EDAW selectively re-contacted certain key government agencies (i.e., the City and County growth management agencies and state DEP) for their input as the specific routes were being developed. The purpose of this contact was to obtain more specific feature information that was only generally available during the initial phase of this work.

Task 7 – Rank and Compare Alternatives

The objective of this task was to compile and compare the data collected for each alternative route in order to understand and demonstrate their relative merits and tradeoffs.

The first step was to compile the information collected in the previous task. This was done in tabular and matrix form by alternative. The data was initially compiled by link (the individual segments in the network of alternatives) for each criteria condition. These link totals were then compiled as alternative route totals.

The second step under this task was to review the compiled data in order to understand the differences within the overall tradeoffs among alternatives. For this purpose, a variety of graphic

display techniques were employed to accentuate the differences and show the relative advantages and disadvantages of each in comparison to the others. This information was reviewed with the City.

The City provided relative order of magnitude costs for six of the highest ranked alternatives: Routes A, E, F, N, P, and T along with an assessment of engineering constraints.

Task 8 – Second Public Workshop

The objective of the second public workshop was to inform the public about the results of the analysis, and to seek their input regarding the routes and their relative tradeoffs.

The first step was to organize the workshop, including the format, time, place, methods of announcement, exhibits, etc. Because of the success and public acceptance of the first workshop format, the second workshop was also held as an open house where there was opportunity to review the exhibits, informally discuss the project with City and consultant representatives, and to comment, both formally and informally.

Following the public workshop, the input received was compiled and evaluated relative to the various routing alternatives.

Task 9 - Recommendations

The work completed under this contract was limited to an assessment of the land use and environmental analysis and the public and agency input received. It was on this basis that a recommendation was developed. Typically, however, this recommendation is based on additional considerations. At a minimum, cost and engineering information, schedule implications and the permitting climate are considerations that need to be part of the selection of a recommended route. At the express direction of the City, the recommendations contained in this report were made without City influence and are based on the results of the technical studies, cost data for the six primary alternatives, public involvement conducted by EEC/EDAW, and engineering considerations provided by the City.

Results

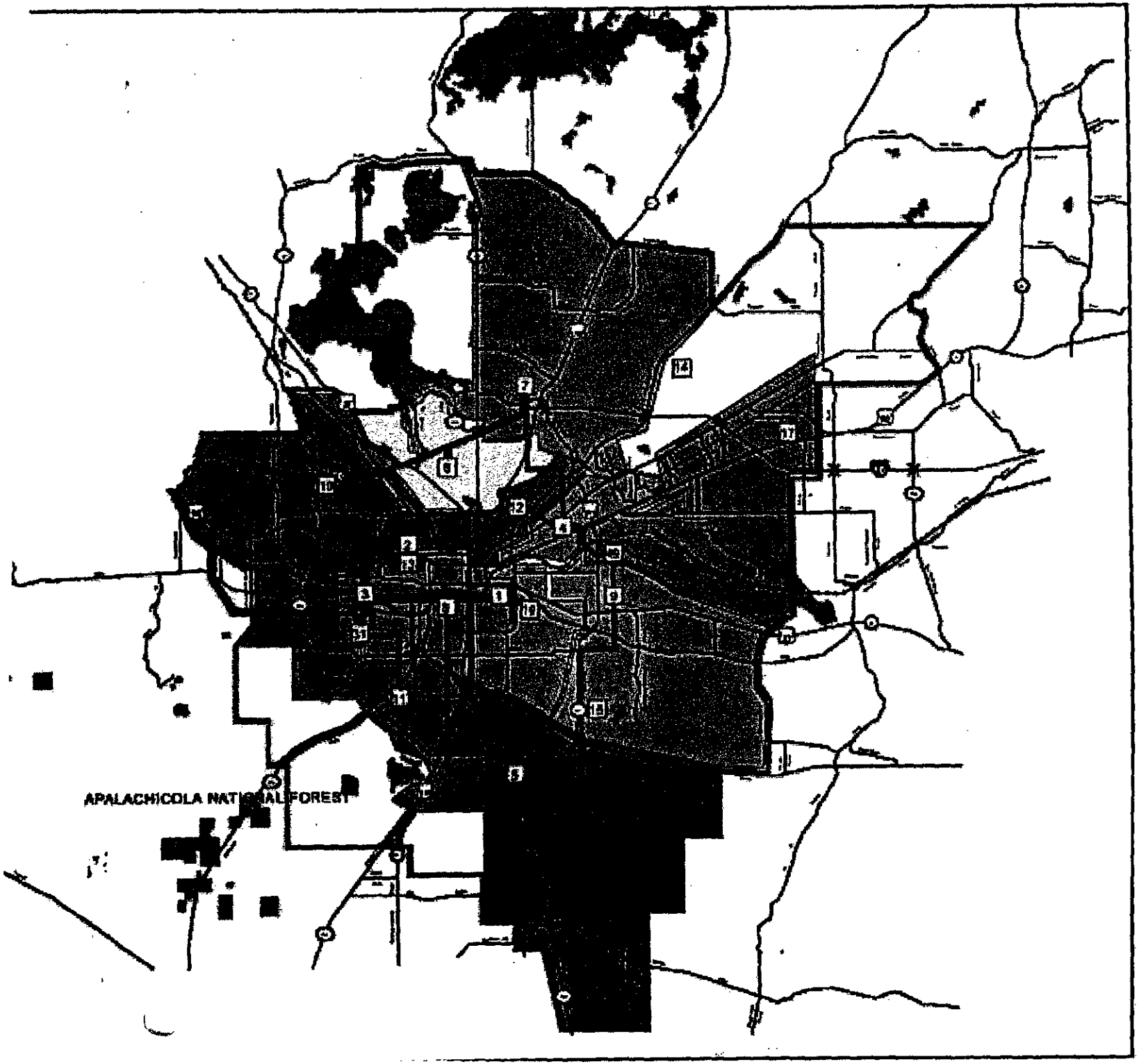
Purpose and Need

The need for the project was never in doubt – the eastern portion of the service territory is substantially underserved by transmission and substation infrastructure. As a result, much of this area is served from distant substations on various radial feed distribution connections, making the system subject to more frequent and more lengthy outages.

Figures 1 and 2 illustrate the existing situation and future desired situation, respectively, with regard to the location of transmission lines, substations and the geographic area served from each substation. As Figure 1 shows, much of the eastern portion of the service territory is served from distant substations covering large geographic areas, compared to those substations in the central

Line 9A Transmission Line Routing Study

Figure 1. Existing Transmission/ Substation and Distribution System Service Area



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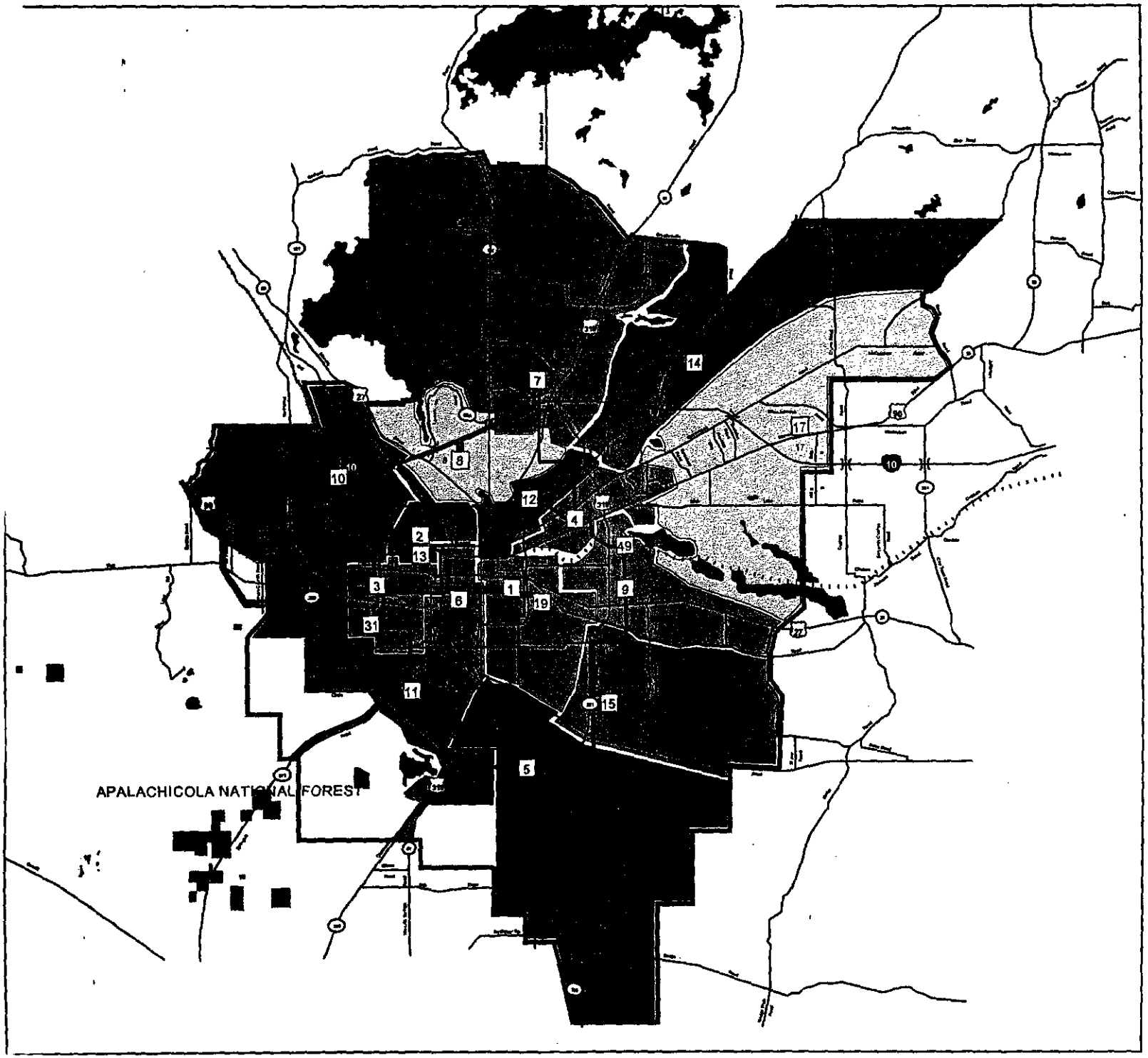
Line 9. Transmission Line Routing Study

Figure 2. Future Transmission/ Substation and Distribution System Service Area



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and western portions of the service area. As noted, this is an overextended system, which can only be remedied through construction of additional substations in the eastern service territory connected by transmission lines to the central grid. The proposed system, illustrated by the configuration shown in Figure 2, would substantially strengthen the reliability of electric service, particularly in the eastern portion of the service area. Substation BP-17 and connecting transmission line 9A would be the first components of this new system structure and are the subject of this study.

In conjunction with the City, a Purpose and Need Statement was developed and has been subsequently refined. This statement, as currently written, is as follows:

> *Over the last decade, the City has experienced significant growth and development, and a corresponding increase in the demand for electricity. This has been especially true in the fast growing eastern portion of the City and adjacent Leon County where development has outpaced the construction of electric transmission lines and substations. Currently, much of the residential and commercial development in this area is fed from substations in central and southern Tallahassee, as shown on the accompanying diagram* [Figure 1]. *The currently inadequate transmission and substation network in this large and rapidly growing part of the City's service area creates a reliability concern.*
>
> *As a standard design practice for reliability, residential and commercial customers should be able to be fed from a number of alternative substations in the area when a major outage occurs. These alternative substations are all linked together by a transmission line network. When major outages occur, the City must currently rely on the lower voltage distribution system to keep the power flowing to its customers. This lower voltage system has capacity limits which would prevent the uninterrupted flow of power in the event of a major outage. Further, much of this system is currently served by radial, or one-way feed from distant substations, so that a distribution line failure would effectively leave all customers beyond that point without power until the cause of the outage was found and repaired.*
>
> *The only acceptable and permanent way of providing a reliable source of electricity and providing for continuing growth to the eastern part of Tallahassee is to reinforce this area with the proper substation and transmission infrastructure. This infrastructure cannot wait any longer. A temporary substation has already been constructed and now an additional distribution feeder is needed to support the area load while the study continues for the selection of a suitable route for the transmission line. However growth on the electric system continues and the load is projected to increase at a rate of approximately 3% per year in the near future. Considering that substations in the east part of the service territory are approaching maximum load, major problems are likely to occur if the proposed substation and transmission line are not in service by the 2004/2005 winter peak.*

Study Area

Following the initial study kickoff meeting, a field reconnaissance was conducted to better understand the land use patterns and potential issues present. Based on this and subsequent data collection efforts, a study area was developed. Three objectives were considered in the development of the study area, including:

- An area of sufficient size and appropriate configuration to allow for the development of all potentially feasible routing options.
- An area that provides adequate opportunities to minimize significant environmental impacts.
- An area that is no larger than necessary to accomplish the needs of the above.

With these considerations in mind, a study area was developed that extended from Mahan Drive on the north to Apalachee Parkway on the south, and from Capital Circle on the west to Chaires Crossroad on the east.

Initial Data Collection

A substantial amount of available data was retrieved from the City/County GIS database, and additional information was taken from the state GIS database. Together, this information was composited onto five maps: Existing Infrastructure, Jurisdictions and Selected Land Use, Land Cover, Environmental Features, and Zoning. Each of these is presented and described in turn. Common to each of these maps is the location of Substations BP-9 and BP-17 (proposed); and the location of existing transmission lines and primary distribution lines, city limits, roads, railroads, and ponds and lakes.

Existing Infrastructure

Figure 3 is a reduced version of the Existing Infrastructure map. In addition to the common features identified above, it shows the location of buildings and ownership parcels over an aerial photo base. The aerial photo coverage is incomplete within the study area, but is shown where it exists because of its added value in understanding land use and land cover conditions within the study area. As this map illustrates, residential areas are scattered throughout the study area in varying degrees. The greatest concentration of homes is in subdivisions off Mahan Drive, Buck Lake Road and Apalachee Parkway.

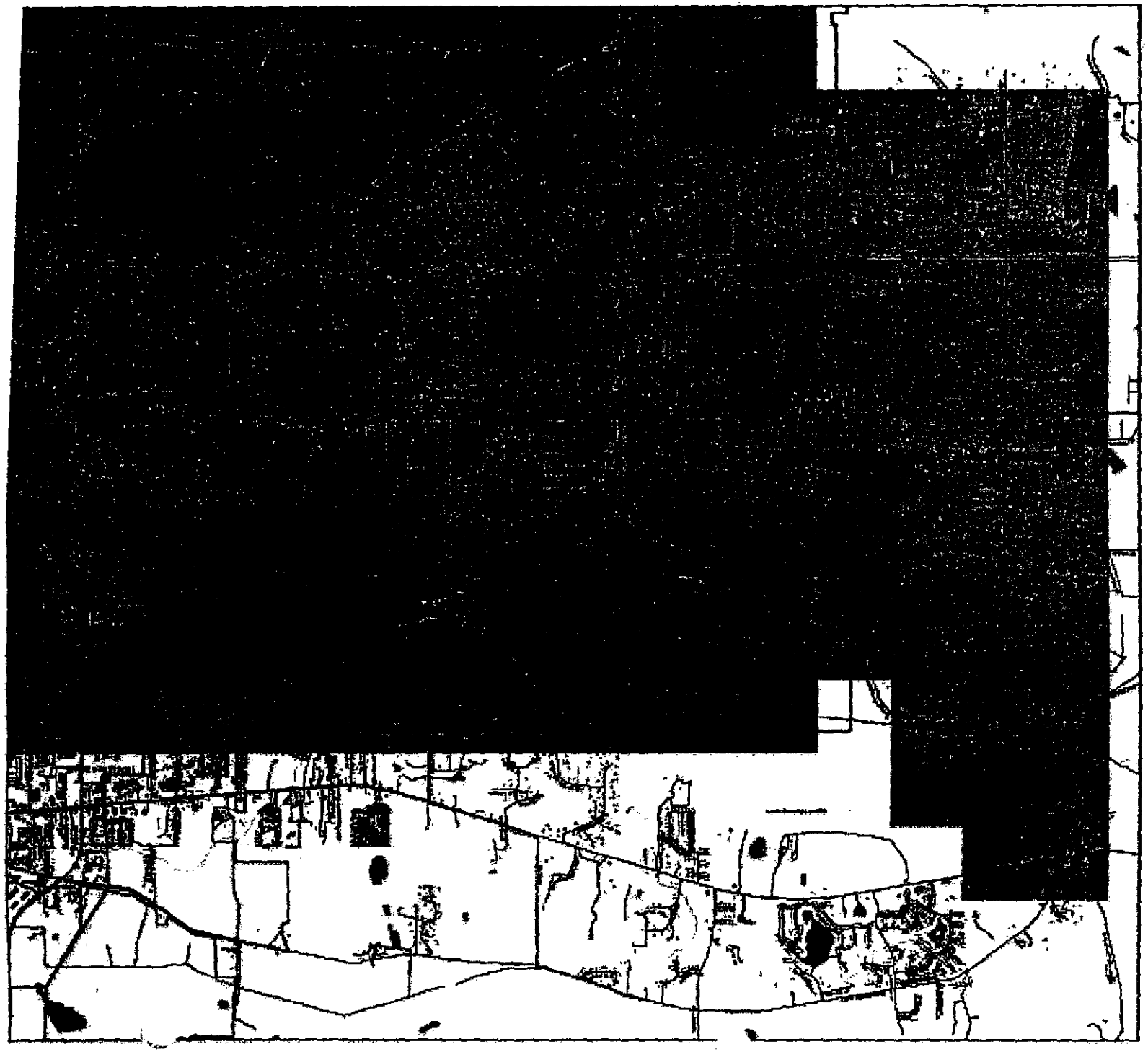
The density of homes gradually decreases from west to east, resulting in a somewhat greater opportunity for transmission line siting in the east. Similarly, the residential parcel size is generally larger in the eastern portion of the study area.

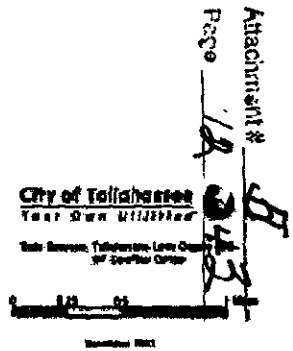
Commercial and institutional buildings are primarily located in the western part of the study area. However, there are a number of schools located throughout the study area as indicated on this map.

The exception to these general trends is in the south-central and west-central portions of the study area, where relatively large tracts of land are absent of development.

Line 9A Transmission Line Routing Study

Figure 3. Existing Infrastructure





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Jurisdictions and Selected Land Use

Figure 4 better illustrates the complex pattern of City and County lands within the study area. While both the existing and proposed substations are/will be located within City limits, it is inevitable that the intervening land in Leon County will be crossed in making the transmission line connection between them. Also shown on this map are some special uses, including selected institutional uses and open space/parks. Major institutional uses (shown on Figure 4) include the lands associated with the federal correctional institution and the county landfill. Open space and park lands include Tom Brown Park (and the extension of undeveloped open space that includes Piney Z Lake), Chaires Capitola Community Park, Edwards Wildlife Area and the Miccosukee Greenway. Open space not indicated on this or any of the maps at the present time is the 475-acre J.R. Alford Greenway, which includes much of the undeveloped City lands north of the railroad and west of Chaires Capitola Community Park. A draft master plan is currently being developed for this area. (The nature and status of these lands became clear only as a result of input received at the public workshop as noted below).

Land Cover

Figure 5 shows land cover, either as built or in its undeveloped condition. While complex in detail, it also indicates the broad patterns present. For example, most of the tan-medium brown colors indicate various densities of residential development, while the dark blue, red and lavender colors represent various types of industrial, commercial and institutional development. The uplands are primarily crop and rangeland (shades of yellow) and timber (dark browns), while the lowlands are various types of wetland and open water (blues and greens). Other land cover types include tree crops in the uplands (olive color), cemeteries (purple), shrub and brushland (mottled pattern), and undeveloped urban land (gray).

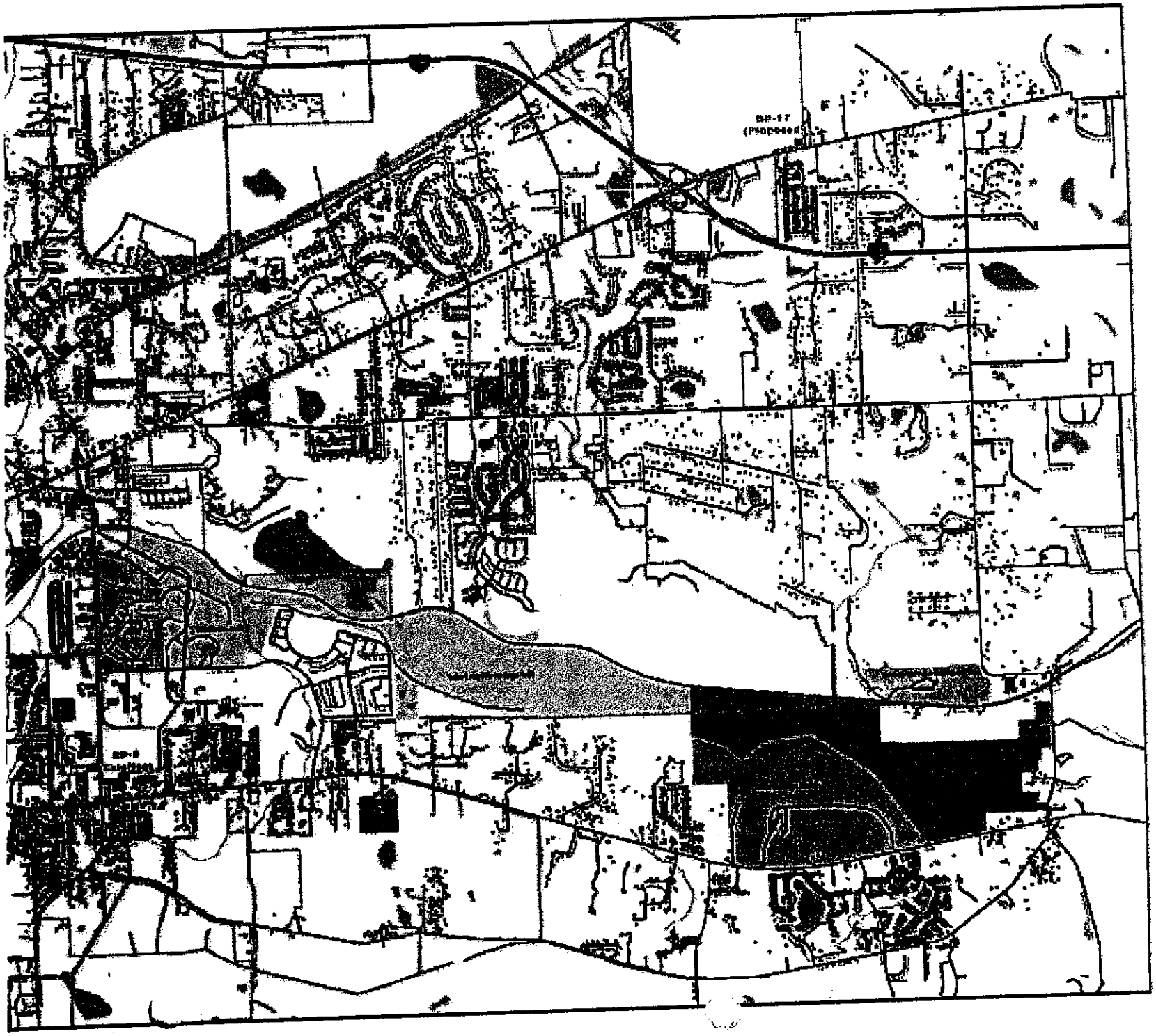
This map illustrates undeveloped and less developed lands, which are obvious candidate areas for further investigation of possible routes. However, in light of the previous map, it must be recognized that there are other land use and potential environmental issues on these lands that must be considered as well.

Environmental Features

This map (Figure 6) illustrates wetlands, floodplains, floodways, open water, watershed boundaries and sink holes. As such, it begins to add clarity to the overall understanding of permanent and intermittent wetlands within the study area and the potential constraints they represent. In this respect, the most extensive features are the Lake Lafayette complex of interconnected wetlands, which extends across the study area from west to east, and the Alford Arm Tributary, which extends from this complex to the north. A number of additional isolated wetlands and open water ponds are scattered throughout the study area, making these environmental features an important consideration in the development of transmission line routes.

Line 9A Transmission Line Routing Study

Figure 4. Jurisdictions and Selected Land Use



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Line 5A Transmission Line Routing Study

Figure 5. Land Cover

Legend

City of Tallahassee

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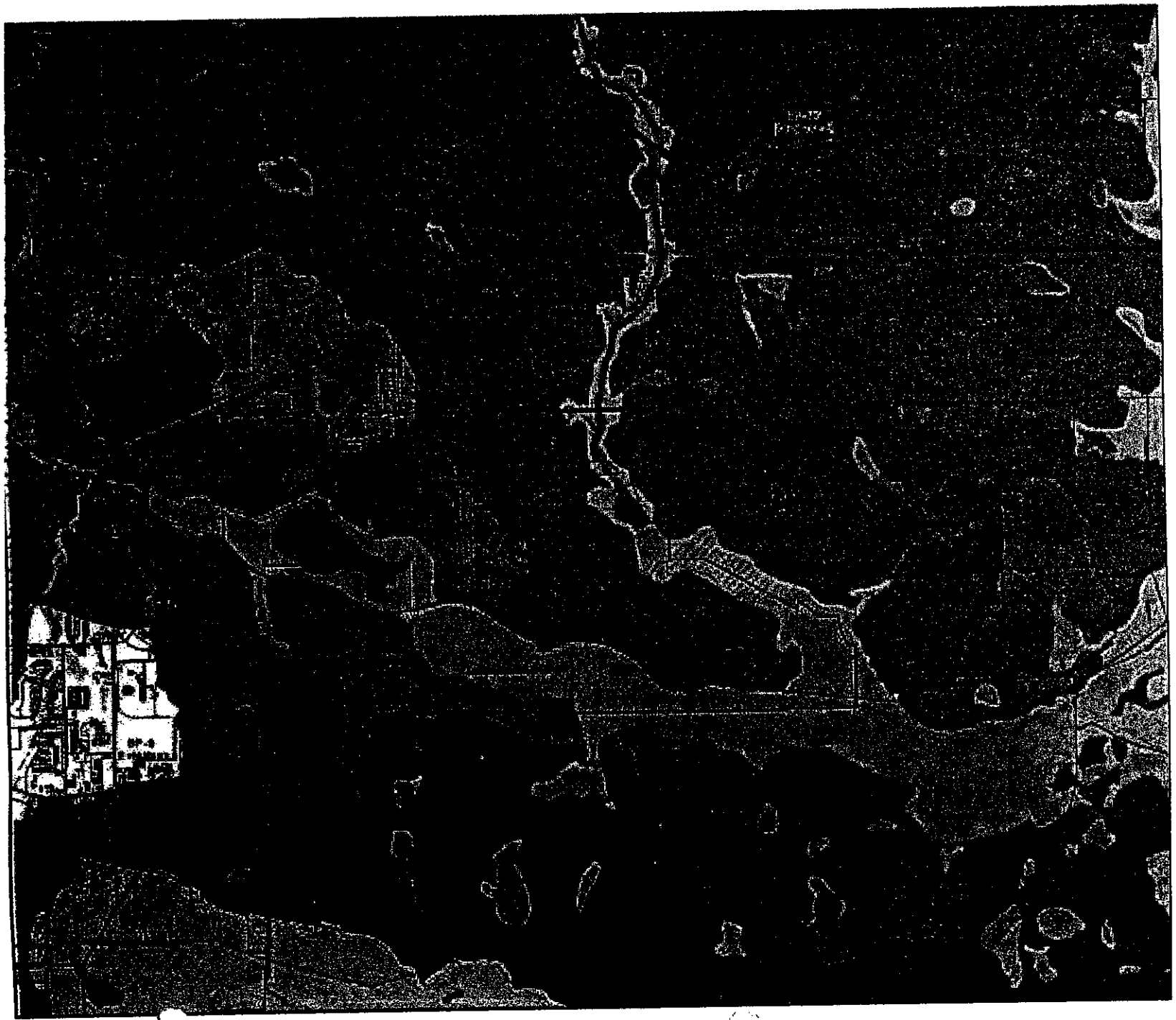


Line 9A Transmission Line Routing Study

Figure 6. Environmental Features

Legend

City of Tallahassee

Zoning

The location of transmission lines is seldom influenced by zoning, since such urban infrastructure is considered essential and almost universally designated as a "use by right." However, zoning can reveal patterns of existing development and an indication of the nature of future development, which is helpful in attempting to site lines with minimal impact. The zoning pattern shown on Figure 7 provides various insights, including a PUD directly north of Lake Lafayette, and a differentiation in residential development between the yellow (Low Density Residential) and the green (Urban Fringe) in the eastern portion of the study area.

Agency Meetings

Additional information was received as a result of various agency meetings conducted during the data collection and analysis portions of the study. Meetings were held with the following agencies:

- Florida Department of Environmental Protection
- City of Tallahassee Growth Management Office
- Leon County Growth Management Office
- Florida Department of Transportation

Inquiries were also made with the Florida Wildlife Commission, the Florida Department of Agriculture, the Florida Natural Areas Inventory, and the Florida Office of Sovereign Submerged Lands.

From these meetings and inquiries, additional natural resource information was obtained as well as a more comprehensive understanding of the permitting and regulatory environment, issues of concern to these agencies, and coordination of projects (i.e., the Mahan Drive expansion).

Data Analysis

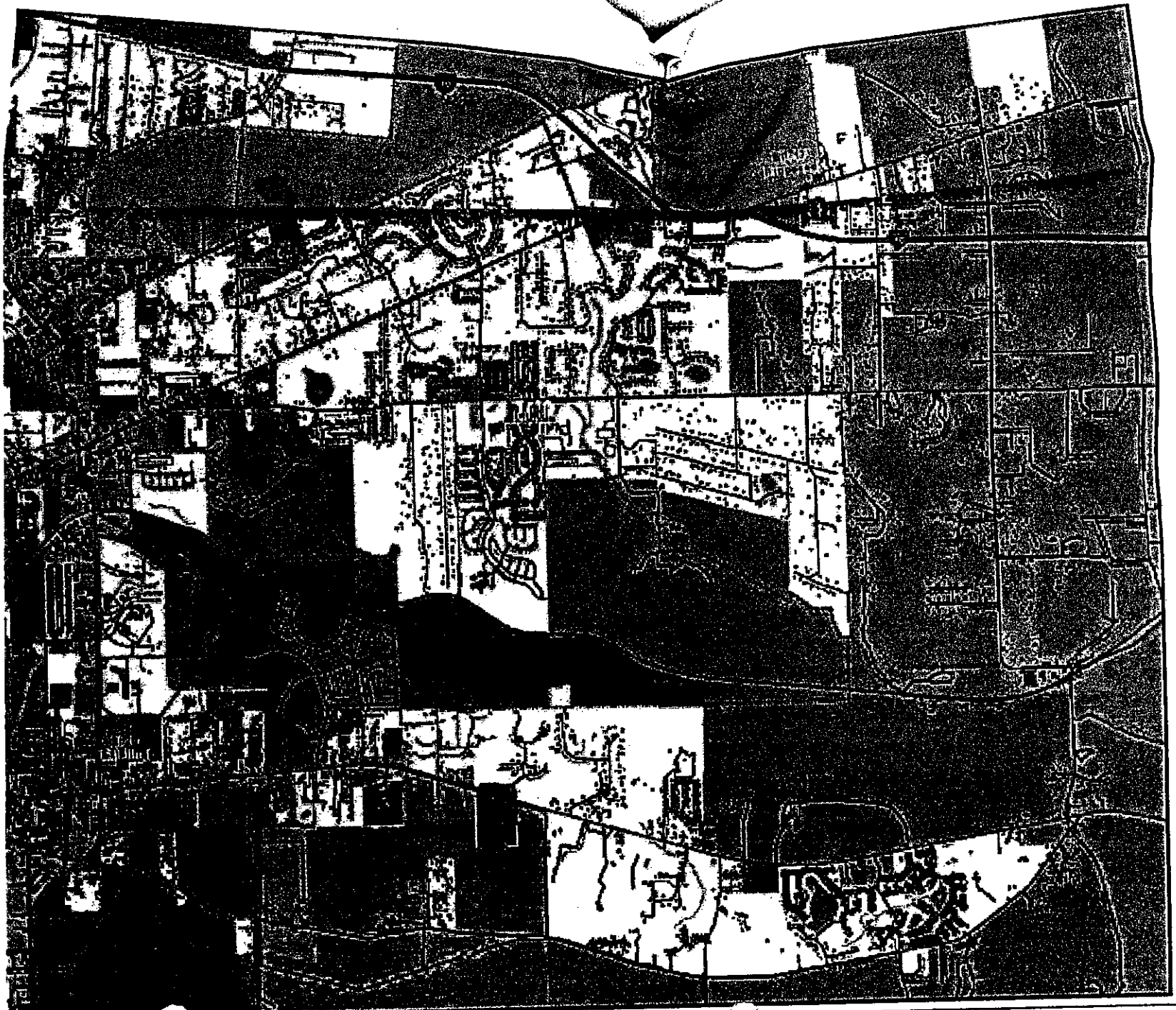
The collected information was compiled, mapped and reviewed in the field. From this, a list of constraints and opportunities were developed within the following general hierarchy of land use/resource sensitivity to transmission line construction and operation:

- **Very High** - Areas that contain resources/land uses protected by legislation and/or administrative policy, or present a severe physical constraint to transmission line construction and operation. As a result, it would be very difficult to locate a transmission line in these areas, and they would therefore generally be avoided in the development of alternative corridors.

- **High** - Areas that contain resources/land uses that are considered to be highly sensitive (as indicated by land use plans, guidelines, etc.) and/or present a potential for significant impacts that could not be readily mitigated. Locating a transmission line in these areas would require careful siting and/or special design measures; they would be avoided where possible in the development of alternative corridors.

Line 9A Transmission Line Routing Study

Figure 7. Zoning



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- **Moderate** - Areas that contain resources/land uses that are moderately sensitive to disturbance, or that present a moderate physical constraint to transmission line construction and operation. Resource conflicts or physical constraints in these areas can be addressed with standard mitigation measures; these areas would not be avoided in the development of alternative corridors.

- **Low-None** - Areas that do not contain known sensitive resources or physical constraints, and therefore were considered opportunity areas in the development of alternative corridors.

Using the maps and other collected information, these general guidelines were used to test the potential for alternative corridors (as a preliminary step in the development of routes). The results of this exercise indicated that there are four general routing scenarios, each with one or more potential specific routes. These general routing scenarios are illustrated on Figure 8 and include the following:

1. A route or routes leading from BP-9 to Mahan Drive, which would be followed in some manner directly to the location of BP-17.

2. A route or routes leading to Buck Lake Road, which would be followed to one of several points from which a connection to BP-17 could be made across the less developed lands of the eastern portion of the study area.

3. A route or routes leading eastward from the existing line in Tom Brown Park (using some combination of the railroad and open adjacent lands) to one of several points in the eastern portion of the study area, where a connection could be made to BP-17 via the more open lands in this area.

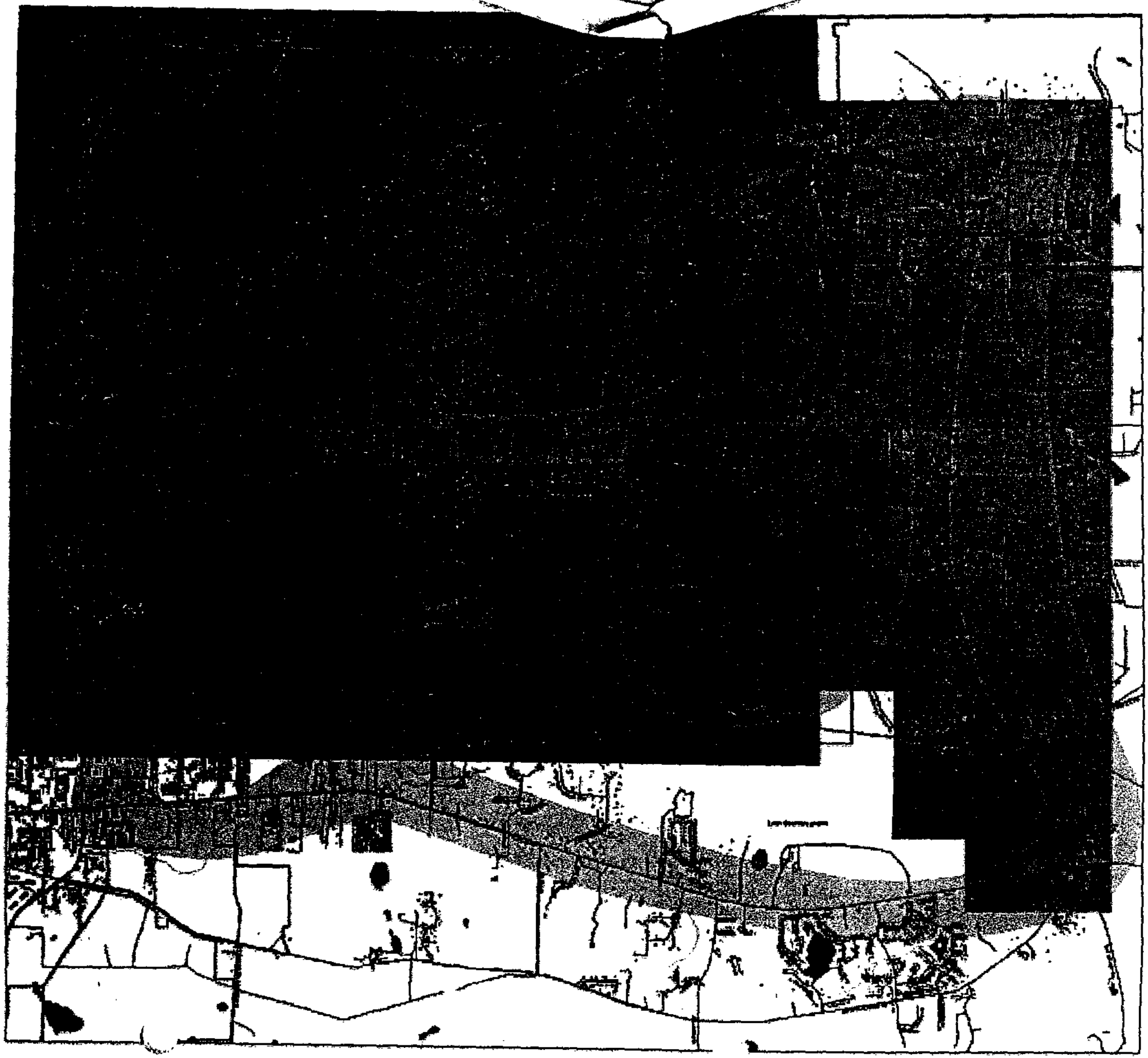
4. A route along Apalachee Parkway to the vicinity of Chaires Cross Road, and then northward along one of several routes in this less developed area to BP-17.

It therefore became clear that there were a number of potentially acceptable routes with a complex overlay of land use and environmental tradeoffs.

Public Workshop

A public workshop was held in open house format on August 27, 2002 from 3-7 pm at the Capital City Christian Church on Mahan Drive. The workshop was announced via direct mail to those persons living within the study area, in a newspaper announcement in the *Tallahassee Democrat* on August 26 and on highway signs along Mahan Drive in the days leading up to the event.

A greeter's table was staffed by a Utility Department representative, who directed attendees to sign in and oriented them to the process and exhibits. Three stations were set up at which enlarged exhibits were assembled. These included the following stations:



Line 9A Transmission Line Routing Study

Figure 8. General Routing Scenarios

Legend

City of Tallahassee

Your Own Utilities

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Purpose and Need

This station was staffed by a Utility Department representative. Exhibits included:

- Project objectives (an abbreviated Purpose and Need Statement).
- Maps of the existing distribution service and the proposed distribution service (Figures 1 and 2 of this report).

Engineering

This station was staffed by three Utility Department representatives, including the City's Project Manager, the Department's representative on tree issues, and the Department's representative on real estate issues. Exhibits included:

- A typical ROW cross-section illustrating ROW width, structure height and clearance requirements.
- Project schedule.
- Base map on an aerial photo.

Study Process and Issues

This station was staffed by three representatives, including the project managers from EEC and EDAW, and the Department's representative responsible for environmental issues. Exhibits included:

- Study Process Flow Chart.
- Data Maps (Figures 3-7 in this report).
- General Routing Scenarios Map (Figure 8 in this report).

Participants were encouraged to move among the three stations, review the exhibits and visit with project representatives. Informal comments were recorded on flip charts at each station. Formal comment forms were also provided for participants to give their input and to request additional information.

A total of 65 people registered their presence on the sign-in sheet. Of these, 33 filled out comment sheets at the open house. Additional comment forms and other written comments were received following the workshop.

Public Input

A summary of the input received at the workshop and from correspondence received thereafter is presented below.

Question: *What key issues should we address in planning this project? Please list in priority order.*

- There were 22 comments asking that the transmission line be kept away from subdivisions and neighborhoods with children. They asked for a route with the least impact on families,

homes and land, which would mean using only existing rights-of-way, main roads and commercial areas.

- 13 respondents were concerned with the environmental impact of the transmission line. They want the following items to be protected: trees, green space, wildlife and wetlands.
- 7 respondents were concerned with the transmission line crossing existing property lines, any unsightliness and, most importantly, a possible decrease in their property values.
- 7 respondents had concerns about possible health problems resulting from the transmission line and EMF's. They do not want the line to be in close proximity to any schools or playgrounds.
- Construction costs and economic losses were a concern for 5 respondents.
- 5 respondents asked that underground construction be considered for this project.
- 3 respondents want the aesthetic vistas of their open space and parks to be preserved.
- 1 respondent was concerned that TV and satellite systems would be affected.
- 1 respondent was concerned with the distance/length of the line.
- 1 respondent asked that the affected landowners be given options.

Responses to the Compatibility with Various Land Use/Environmental Conditions. General agreement on the following:

- **Avoid in ALL cases**: Proximity to homes, direct views from homes, residential streets.
- **Avoid when possible**: Poles in wetlands, proximity to sensitive wildlife/habitats, large/mature trees.
- **Mitigate to the degree possible**: Crossing public open space, crossing vacant public land.
- **Not a concern**: Locate along a major highway.

Evenly split opinions among respondents:

- Removal of sheds, indirect views from homes, lines over wetlands, removal of general woodland vegetation.

The results of this input showed sensitivity to a wide range of land use and environmental issues, as was anticipated.

Route Development

Following the public workshop, field reconnaissance efforts were focused on the definition of specific routes within each of the four general routing scenarios. Using the data previously collected in conjunction with field investigations to document the actual presence of site-specific conditions, a network of routes were developed and refined. For example, while the homes and property lines were shown on previously collected GIS data, the assessment of homes within 100' as well as views from homes was determined by driving all the potentially affected neighborhoods and making specific records for each house on an enlarged base map with regard to whether the line would physically or visually impact that home.

As a result of these detailed field investigations, it became clear that development of routes in the vicinity of the Chaires community within the southern routing scenario would not be feasible.

This area contains a combination of extensive wetlands, a designated historic district, a school and homes in a configuration that would preclude locating a transmission line here without the removal of homes, historic structures, or passing over the school grounds. These were judged to be unacceptable types of impacts. Routes using a portion of Apalachee Parkway near the substation and diverging northward west of the Chaires community, however, were developed.

During this period of time, additional agency meetings were held to review the preliminary routes as they were being developed and to obtain feedback regarding any additional sensitivities or issues of concern to these agencies. This included meetings with the Tallahassee Growth Management Agency, the Leon County Department of Community Development, the Leon County Division of Parks and Recreation, the Florida Department of Environmental Protection, and the Genesis Group (under contract to the County for the Mahan Drive corridor study). Based on their input, alternatives were refined to minimize effects to sensitive features and land uses to the greatest degree possible. This included dropping some routes from further consideration due to the extent or nature of potential impact. Most notable in this regard was the deletion of routes previously developed through the central portion of the J. R. Alford Greenway.

During this phase of the study, the CSX Railroad was contacted to open discussions regarding use of their right-of way as a possible east-west route. They indicated their willingness to do so. They were referred to the City for more detailed discussions regarding the terms of this use including the installation of this line at a fee. The City has indicated that there are liability concerns with the sample agreements that CSX has provided and that in the past, the City has had difficulty reaching agreement with CSX regarding these concerns on other projects. Because of this, the railroad is considered problematic. Nevertheless, use of the railroad as a possible routing opportunity was retained pending further evaluation and discussions with CSX.

Figure 9 shows the final network of alternatives that were developed as a result of the route development process. As illustrated on this map, the network of routes is made up of a number of individual segments or links. Each of these individual links is numbered. Connections from the existing BP-9 Substation to the proposed BP-17 Substation could therefore be made by various link combinations.

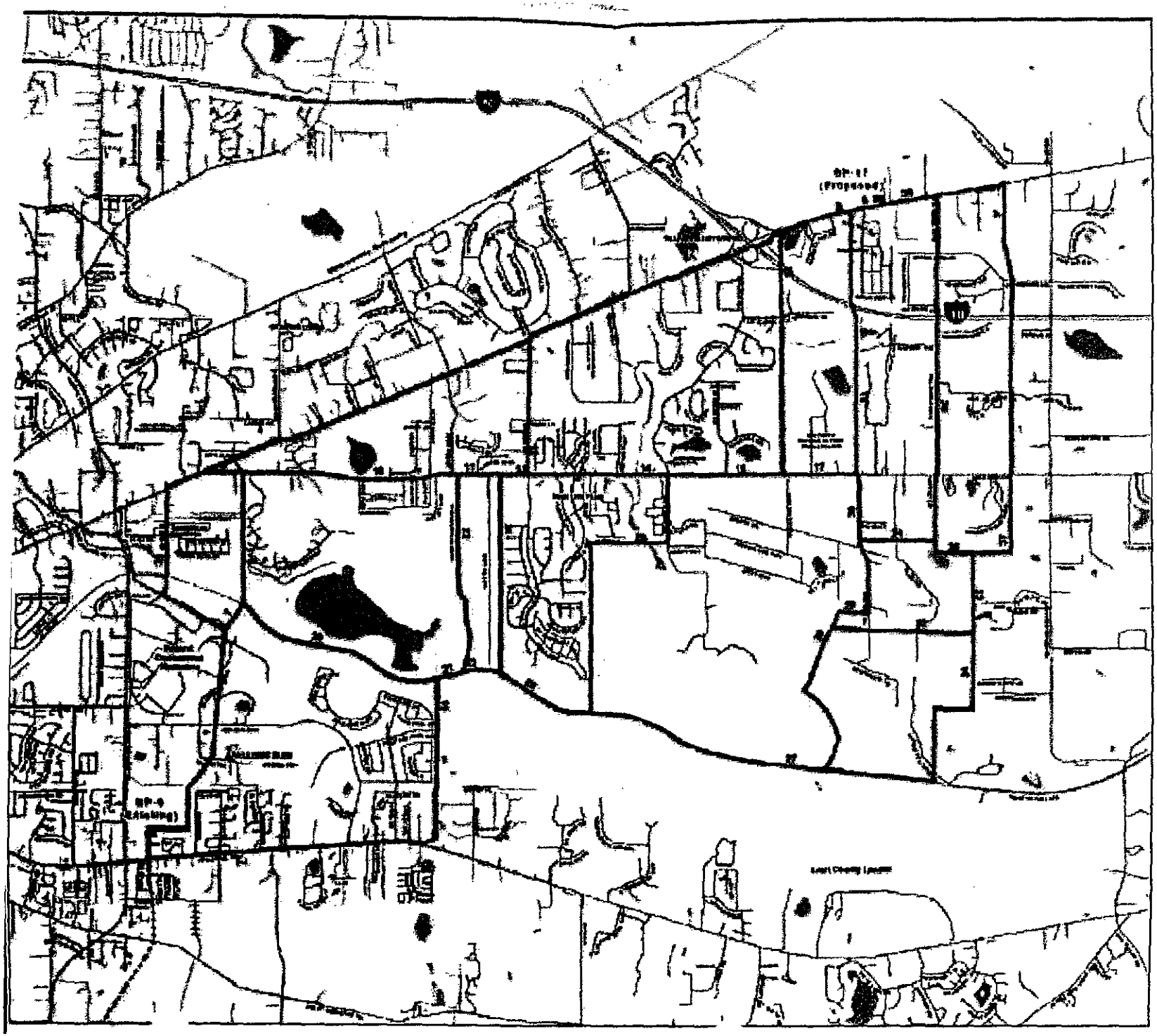
Figure 10 is a link-route combination table which shows the 37 different link combinations (routes) that can be used to connect these two substations.

Route Evaluation and Comparison

In order to rank and compare these alternatives, information regarding the land use and environmental issues that had guided the development of routes had to be formalized into a set of route evaluation criteria. These criteria were developed based on the conditions of the lands and resources within the study area, issues raised by the public and the County's Natural Features Inventory criteria. Figure 11 shows the final criteria used to assess alternatives. As this table shows, there are five major criteria conditions: Residential Properties, Public and Commercial Interests, Physical Resources, Visual Considerations, and Biological Resources. Within each of these criteria, categories are a number of related conditions. The internal conditions within each criteria category were weighted to indicate their relative level of significance.

Line 9A
Transmission Line
Routing Study

Figure 9. Study Routes



Line 9A Transmission Line Routing Study, Tallahassee, Florida

Figure 10. Route Link Combinations

Routes	Links
A	1, 2, 3, 4, 5, 6
B	1, 2, 9, 10, 11, 12, 13, 4, 5, 6
C	1, 2, 9, 10, 11, 12, 14, 15, 16, 5, 6
D	1, 2, 9, 10, 11, 12, 14, 15, 17, 18, 6
E	1, 7, 8, 10, 11, 12, 13, 4, 5, 6
F	1, 7, 8, 10, 11, 12, 14, 15, 16, 5, 6
G	1, 7, 8, 10, 11, 12, 14, 15, 17, 18, 6
H	1, 7, 20, 21, 22, 11, 12, 13, 4, 5, 6
I	1, 7, 20, 21, 22, 11, 12, 14, 15, 16, 5, 6
J	1, 7, 20, 21, 22, 11, 12, 14, 15, 17, 18, 6
K	1, 7, 20, 21, 23, 24, 12, 13, 4, 5, 6
L	1, 7, 20, 21, 23, 24, 12, 14, 15, 16, 5, 6
M	1, 7, 20, 21, 23, 24, 12, 14, 15, 16, 17, 18, 6
N	1, 7, 20, 21, 23, 25, 26, 15, 16, 5, 6
O	1, 7, 20, 21, 23, 25, 26, 15, 17, 18, 6
P	1, 7, 20, 21, 23, 25, 27, 28, 29, 30, 18, 6
Q	1, 7, 20, 21, 23, 25, 27, 28, 29, 34, 35, 38
R	1, 7, 20, 21, 23, 25, 27, 28, 29, 34, 36, 37, 38
S	1, 7, 20, 21, 23, 25, 27, 28, 32, 33, 36, 35, 38
T	1, 7, 20, 21, 23, 25, 27, 28, 32, 33, 37, 38
U	1, 7, 20, 21, 23, 25, 27, 31, 33, 36, 35, 38
V	1, 7, 20, 21, 23, 25, 27, 31, 33, 37, 38
W	19, 21, 22, 11, 12, 13, 4, 5, 6
X	19, 21, 22, 11, 12, 14, 15, 16, 5, 6
Y	19, 21, 22, 11, 12, 14, 15, 17, 18, 6
Z	19, 21, 23, 24, 12, 13, 4, 5, 6
AA	19, 21, 23, 24, 12, 14, 15, 16, 5, 6
AB	19, 21, 23, 24, 12, 14, 15, 17, 18, 6
AC	19, 21, 23, 25, 26, 15, 16, 5, 6
AD	19, 21, 23, 25, 26, 15, 17, 18, 6
AE	19, 21, 23, 25, 27, 28, 29, 30, 18, 6
AF	19, 21, 23, 25, 27, 28, 29, 34, 35, 38
AG	19, 21, 23, 25, 27, 28, 29, 34, 36, 37, 38
AH	19, 21, 23, 25, 27, 28, 32, 33, 36, 35, 38
AI	19, 21, 23, 25, 27, 28, 32, 33, 37, 38
AJ	19, 21, 23, 25, 27, 31, 33, 36, 35, 38
AK	19, 21, 23, 25, 27, 31, 33, 37, 38

LINE 9A TRANSMISSION LINE ROUTING STUDY, TALLAHASSEE, FLORIDA
FIGURE 11. ROUTE EVALUATION CRITERIA

ROUTE EVALUATION CRITERIA	WEIGHT
Residential Properties:	
• Number of residences affected by acquisition of ROW (within 100 ft.)	10
• Length of line affecting residential/street trees (mi. X 10)	7.5
• Number of outbuildings to be removed	5.0
• Number of residential parcels crossed	5.0
Public and Commercial Interests:	
• Length of line in designated open space/parks (mi.)	10
• Length of line in conflict with setting of NRHP designated/eligible historic sites (mi.)	7.5
• Length of line in potential conflict with NRHP designated/eligible archaeological sites (mi.)	5.0
• Length of line affecting trees along designated Canopy Roads (mi.)	10
• Length of line affecting street trees along major arterials (mi.)	5.0
• Length of line adversely affecting commercial properties* (mi.)	7.5
Physical Conflicts:	
• Number of poles in karst features	10
• Number of poles in a floodway	10
• Number of poles on designated severe slopes (> 20%)	7.5
• Number of poles on designated steep slopes (10-20%)	5.0
• Number of poles in a 100 year floodplain	5.0
• Number of poles in a 500 year floodplain	2.5
• Acres of disturbance (0.0092 acres/pole x # of poles)	7.5
• Length of line (total route length in miles)	2.5
Visual Conflicts:	
• Number of homes from which transmission line is seen as a prominent visual intrusion1	10.0
• Number of homes from which transmission line is seen as an evident visual intrusion2	5.0
• Number of poles seen as a prominent visual intrusion from open space areas	5.0
• Number of poles seen as an evident visual intrusion2 from open space areas	2.5
• Number of poles seen as a prominent visual intrusion from major public arterials	5.0
• Number of poles seen as an evident visual intrusion2 from major public arterials	2.5
• Number of visible prominent multiple deviations within a 3-span distance (2000')	5.0
Biological Resources:	
• Number of poles located within wetlands	10.0
• Length of line crossing over wetlands (mi.)	5.0
• Length of line located within native or high-quality successional forest (mi. X 10)	7.5
• Length of line located in other woodland (not including street/residential trees) (mi. X 10)	5.0
• Number of poles in proximity to sensitive species (w/ potential for adverse affects)	7.5
• Number of crossings of permanent watercourses	2.5

[1] A prominent visual intrusion is considered to be a feature which is dominant in scale and conflicts with the character of the existing setting in a landscape largely without similar modifications.
[2] An evident visual intrusion is considered to be a feature which is readily visible but not dominant either because of distance/scale or because it is parallel to or replacing an existing transmission/large distribution line.

* Adverse affects to commercial properties include crossing properties at angles rather than along property/land lines, or passing within 100' of commercial buildings affecting their ability to expand (except along highway frontages where zoning requires a highway setback).

In each case, the specific criteria condition judged to be most important was given a weight of 10, and all other criteria **within that criteria category** were assigned weights based on their relative level of significance. For example, within the general criteria category of Residential Properties, there are four specific criteria:

- Number of Residences Affected by Acquisition of Right-of-Way within 100 Feet of the Home (weight of 10).
- Length of Line (in miles x 10) Affecting Residential or Street Trees (weight of 7.5).
- Number of Outbuildings Removed (weight of 5).
- Number of Residential Parcels Crossed (weight of 5).

Of these four criteria, it was judged that having a transmission line on one's property within 100' of the home would be the most significant impact, and it was therefore given a weight of 10. The other three criteria conditions were assessed weights based on their relative level of impact. It was judged that the removal of trees in one's yard or along the street in front of their home would be of lesser impact, but of some significant importance due to the fact that such removal would be essentially permanent in the case of large trees. Outbuildings would be of lesser significance because while it would represent an inconvenience, the cost of relocation or replacement would be compensated for by the City. It was given a weight of 5. Similarly, simply crossing a property would be an impact even if no trees were cut or if the line were at some distance from the home. It was given a rating of 5 as well.

The weights for any given criteria category are relative only to the specific criteria within that category. The weight of 7.5 for the removal of residential or street trees under the Residential Properties has no relationship to the weight of 7.5 for number of poles on designated severe slopes (> 20%) in the Physical Resources criteria category. They are unrelated considerations and cannot be compared against each other. In each case, the weights assigned to a specific criteria condition are relative **only** to the other criteria within that overall criteria category.

The process of determining scores of each criteria category for each route (as shown in Figure 12) was to count the number of occurrences of sensitive conditions encountered by each route, times their weights. These were totaled independently for each criteria category, e.g. a score of 36 for Biological Resources for Route A. Under this approach, the higher the score, the more problematic the route since the scoring is additive for each sensitive feature encountered.

To assist in understanding the relative standing of a particular route within a criteria category, a technique called Rank Ordering was utilized. This puts the range of scores for Physical Resources, for example, on a standardized scale of 1-10. Without some study, it is difficult to quickly assess whether the score of 398 for Route J is a good score or poor score. By taking the range of scores for Physical Resources (104 to 546) and standardizing it to a 1-10 scale, it is easy to determine that Route J is one of the poorer routes, with a Rank Order score of 7.

Rank ordering has another important value. Since each of the five criteria categories are placed on an internal 1-10 scale, they can be added. Adding the raw scores would potentially hide important differences between the routes because of the highly different ranges of scores for these criteria categories. Visual Considerations scores range into the thousands because of the

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Line 9A Transmission Line Routing Study, Tallahassee, Florida

Figure 12. Analysis of Alternative Routes--Compliance

9/30/2003

Criteria		Alternative Routes																
		A	E	B	F	G	Y	D	I	C	J	X	AB	M	Z	AA	L	N
Residential Properties	Total	[redacted]	265	245	361	320	395	300	359	341	317	436	486	450	431	527	450	216
	Rank Order		4	4	6	6	7	5	6	6	6	8	9	8	8	10	8	1
Public and Commercial Interests	Total		155	187	133	124	120	147	88	156	80	129	114	73	155	123	83	74
	Rank Order		7	8	8	5	5	6	4	7	4	6	5	3	7	5	4	3
Physical Resources	Total		120	122	185	133	180	118	428	146	398	210	169	412	175	199	417	460
	Rank Order		1	1	2	2	2	1	8	1	7	3	2	7	2	3	8	9
Visual Considerations	Total		1220	2428	1248	1398	1958	2605	1205	2465	1345	1818	2350	1638	2173	2210	1598	1343
	Rank Order		3	10	4	5	7	10	4	10	5	7	9	6	8	9	6	4
Biological Resources	Total		28	23	33	40	48	38	52	31	60	40	49	50	34	41	53	77
	Rank Order		1	1	1	1	1	1	2	1	2	1	1	2	1	1	2	3
Route Scenarios		1	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	4
	Rank Order Total	27	17	24	19	19	22	23	24	25	24	25	26	26	25	28	28	20

Criteria		AC	AD	O	H	W	K	AE	P	AG	T	AF	AH	AI	R	Q	V	AK	S	AJ	U
Residential Properties	Total	194	152	75	262	340	354	276	199	299	217	540	555	294	222	463	196	273	477	534	456
	Rank Order	3	2	1	4	6	6	5	3	5	3	10	10	5	4	9	3	5	9	10	8
Public and Commercial Interests	Total	114	106	65	120	160	114	65	25	109	68	77	77	109	68	9	66	107	36	75	34
	Rank Order	5	4	3	5	7	5	3	1	5	3	3	3	5	3	1	3	5	38	3	2
Physical Resources	Total	242	213	431	404	186	393	280	498	308	521	285	291	303	526	504	546	328	509	318	534
	Rank Order	4	3	8	7	2	7	4	8	5	10	5	5	5	10	10	10	6	10	5	10
Visual Considerations	Total	1955	2095	1483	1168	1780	1560	1285	673	1180	528	1323	1293	1140	568	683	448	1060	680	1213	600
	Rank Order	7	8	5	4	7	6	4	1	4	1	4	4	4	1	1	1	3	1	4	1
Biological Resources	Total	66	74	85	44	33	45	113	125	154	166	115	117	154	166	122	206	195	128	158	169
	Rank Order	3	3	4	2	1	2	5	6	7	8	5	5	7	8	6	10	10	6	8	8
Route Scenarios		4	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Rank Order Total	22	20	21	22	23	26	21	20	26	25	27	27	26	26	27	27	29	62	30	29

Route Scenarios

1	Mahan
2	Mahan/Buck Lake
3	Buck Lake
4	West RR
5	East RR

nature of the conditions counted, while the scores of Public and Commercial Interests range only into the low 100's. Important considerations here, such as the number of poles in designated open space areas, would be lost if the raw scores were added due to the great difference in the raw scores between the five criteria categories.

By putting them each on a comparable scoring basis through rank ordering, the scores can be added to indicate the relative level of overall compliance with all five criteria categories. This is only one measure, however, as it assumes an equal value is put on each of the five criteria categories. A person most concerned about Biological Resources may care more about scores for that consideration than the Rank Order Total. The total, however, is an important consideration if the objective is to identify the route that has the best overall compatibility, and hence, consideration for the broader Tallahassee/Leon County community interests.

As noted, Figure 12 shows the raw scores and rank order scores for each of the 37 routes for each of the five criteria categories. It also shows the Rank Order Total scores. In addition, this figure identifies general routing scenarios in a row near the bottom of the chart. These are much the same as the original four routing scenarios identified early in the study prior to the development of specific routes (see Figure 8). There are five such scenarios now identified. They include:

- Mahan Drive – A single route (Route A), which maximizes use of Mahan Drive.
- Mahan Drive-Buck Lake Road – 2 routes (B and E) that nearly equally split their use of these two roads.
- Buck Lake Road – 13 routes that use Buck Lake Road to a large degree.
- West Railroad – 7 routes that use the railroad right-of-way in the western portion of the study area only,
- East Railroad – 14 routes that maximize use of the railroad right-of-way by extending into the eastern portion of the study area

In each case (except the East Railroad routing scenario), a single route is identified by a color. The colors represent the best overall route based on best Rank Order Total score within each routing scenario. The exception is the East Railroad routing scenario where two routes are highlighted – Routes P and T. Route P has the best Rank Order Total score; Route T has a poorer score, but was included since it represents a route that extends farthest to the east where the population density is least. These six routes (A, E, F, N, P and T) form what are referred to as Primary Alternatives – the routes that score best overall within each of the primary routing scenarios. The path of these alternatives is highlighted on the aerial photo in Figure 13.

Figure 14 is a table that focuses on a comparison of these six routes. The shading identifies which of the six routes had the first and second best rank order scores for each criteria condition. As this figure illustrates, Route A has the best compliance with two of the five criteria categories – Physical Resources and Biological Resources. It is also important to note that while scoring best in two of the five criteria, Route A also scored worst in two of the criteria – Public and Commercial Interests and Visual Considerations, hence its poor overall Rank Order score.

Line 9A Transmission Line Routing Study, Tallahassee, Florida

9/30/2003

Figure 14. Primary Alternative Route Comparison

Compliance Scores

	Primary Alternatives					
Criteria	A	E	F	P	T	N
Residential Properties	270 5	265 4	361 6	[illegible]	[illegible]	
Public and Commercial Interests	244 10	165 7	133 6		[illegible]	[illegible]
Physical Resources	[illegible]		[illegible]	498 9	521 10	460 9
Visual Considerations	2,490 10	[illegible]	[illegible]			[illegible]
Biological Resources				125 6	166 8	[illegible]
Total of Ranks	27	17	19	20	25	20
Route Length (Miles)	8.1	7.9	8.5	10.1	11.8	9.4

Best Compliance

Second Best Compliance

Lower Compliance

16
1

Total Criteria Score
Total criteria score is the numerical score obtained from use of the weighted route evaluation criteria.

Rank Order Score
Rank order reflects a route's position relative to the other alternatives, i.e. a 1 indicates that this route is best among the alternatives for a given route evaluation criteria.

Key

3 — Overhead effects

7 — Underground effects

Criteria most benefitted by undergrounding

Criteria most disadvantaged by undergrounding

Figure 16. Im[illegible]ts of Overhead vs. Underground Transmission Line Construction

	A	E	F	P	T	N
Residential Properties:						
Number of residences affected by acquisition of ROW (within 100 ft.)	24 24	23 23	25 25	3 3	4 4	2 2
Length of line affecting residential/street trees (mi. X 10)	0.00 0.00	0.00 0.00	0.55 0.55	0.86 0.86	0.83 0.83	0.55 0.55
Number of residential parcels crossed	6 6	7 7	14 14	21 21	23 23	13 13
Public and Commercial Interests:						
Acres disturbed in designated open space/parks	0.19 0.00	0.10 0.46	0.10 0.46	0.65 0.46	0.65 0.46	0.96 3.22
[illegible]	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00	0.00 0.00
Acres of potential cultural sites disturbed	0.00 0.00	0.00 0.00	0.00 0.00	0.92 4.59	0.92 4.59	0.92 4.59
Length of line adversely affecting commercial properties* (mi.)	0.38 0.38	0.10 0.10	0.10 0.10	0.19 0.19	0.00 0.00	0.10 0.10
Physical Resources:						
Acres of karst features affected	0.00 0.55	0.28 1.79	0.28 1.79	1.20 3.46	1.29 6.27	0.12 5.97
Acres of floodway affected	0.00 0.21	0.00 0.21	0.00 0.27	0.00 0.00	0.00 0.00	0.00 0.24
Acres of disturbance on severe slopes (>20%)	0.09 0.45	0.09 0.99	0.00 0.30	2.39 5.80	2.30 6.82	0.15 7.35
Acres of disturbance on steep slopes (10-20%)	1.29 3.35	1.29 4.29	1.66 6.53	1.10 5.44	1.29 8.34	0.13 6.43
Acres of disturbance in a 100 year floodplain	0.00 0.89	0.09 2.71	0.28 3.37	1.47 7.79	1.56 14.90	0.12 5.99
Total acres of disturbance	7.8 39.1	7.7 38.3	8.2 41.0	9.8 48.8	11.5 57.4	9.1 45.3
Visual Considerations:						
[illegible]	87 0	16 0	24 0	23 0	17 0	71 0
[illegible]	276 0	176 0	192 0	138 0	11 0	227 0
[illegible]	14 0	9 0	9 0	59 0	59 0	23 0
[illegible]	53 0	80 0	45 0	4 0	10 0	37 0
Acres of permanently cleared ROW	39.1 29.3	38.3 28.7	41.0 30.7	48.8 36.6	57.4 43.1	45.3 34.0
Biological Resources:						
Acres of wetlands disturbed	0.00 0.53	0.00 0.92	0.00 0.63	0.37 2.23	0.28 4.27	0.02 1.26
Acres of woodland disturbed	2.30 11.49	2.30 11.49	2.37 11.49	6.34 31.66	7.45 37.19	3.68 18.38
Number of permanent waterways impacted	4 4	3 3	5 5	4 4	10 10	3 3

Routes E and P each scored best in two of the five criteria categories, plus second best in one criteria category. Route E scored best in Physical and Biological Resources and second best in Visual Considerations. Route P scored best in Public and Commercial Interests, and Visual considerations and second best in Residential Properties.

Routes F and T each scored best in one category and second best in two. Route F scored best in Biological Resources and second best in Physical Resources and Visual Considerations, while Route T scored best in Visual Considerations and second best in Residential Properties and Public and Commercial Interests.

Route N scored best in one category – Residential Properties, and second best in three others – Public and Commercial Interests, Visual Considerations, and Biological Resources.

Figure 15 is a Criteria Occurrence Summary chart. It shows the actual number of occurrences that each of these six routes would have with the specific criteria conditions. This provides a detailed documentation of the differences and trade-offs among the primary alternatives.

The issue of undergrounding the line on Mahan Drive or other roadways within the study area was raised by the public at various points throughout the study process. As a result, the City initiated an independent study of undergrounding costs. Since Mahan Drive and Buck Lake Road are the two major road routes through the study area, these roads were selected for detailed study. The detailed underground cost estimates were prepared prior to the final route study; therefore these routes do not fully correspond with the routes developed in this report.

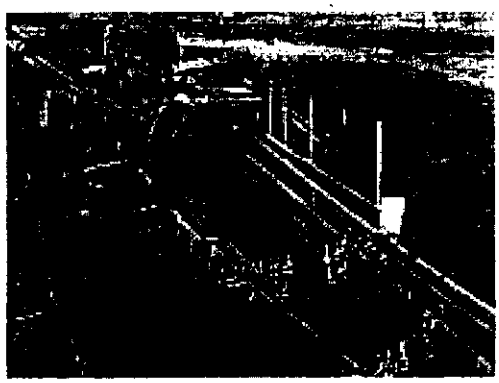

Photo 1

Photo 2

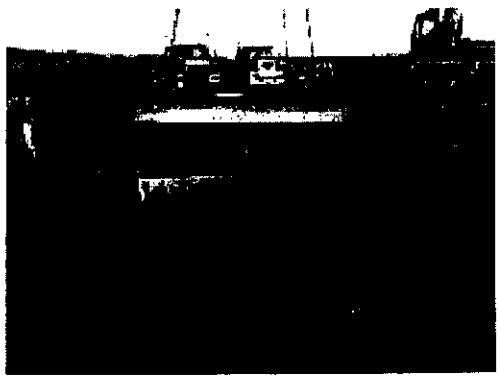

Photo 3

LINE 9A TRANSMISSION LINE ROUTING STUDY, TALLAHASSEE, FLORIDA

Figure 15. Criteria Occurrence Summary

	A	E	E	P	T	N
Residential Properties:						
• Number of residences affected by acquisition of ROW (within 100 ft.)	24	23	25	3	4	2
• Length of line affecting residential/street trees (mi. X 10)	0.00	0.00	0.55	0.86	0.83	0.55
• Number of outbuildings to be removed	0	0	0	0	0	0
• Number of residential parcels crossed	6	7	14	21	23	13
Public and Commercial Interests:						
• Length of line in designated open space/parks (mi.)	0.189	0.095	0.095	0.645	0.645	0.962
• Length of line in conflict with setting of NRHP designated/eligible historic sites (mi.)	0	0	0.284	0.284	0	0.284
• Length of line in conflict with NRHP designated/eligible archaeological sites (mi.)	0	0	0	0.947	0.947	0.947
• Length of line affecting trees along designated Canopy Roads (mi.)	0	0	0	0	0	0
• Length of line affecting street trees along major arterials (mi.)	3.18	2.17	1.73	0.17	0.80	0.76
• Length of line adversely affecting commercial properties* (mi.)	0.379	0.095	0.095	0.189	0	0.095
Physical Resources:						
• Number of poles in karst features	0	3	3	13	14	13
• Number of poles in a floodway	0	0	0	0	0	0
• Number of poles on designated severe slopes (>20%)	1	1	0	26	25	16
• Number of poles on designated steep slopes (10-20%)	14	14	18	12	14	23
• Number of poles in a 100 year floodplain	0	1	3	16	17	13
• Number of poles in a 500 year floodplain	0	0	0	0	0	0
• Acres of disturbance (0.0092 ac/pole x number of poles)	0.83	0.91	0.93	1.03	1.19	0.95
• Length of line (total route length in miles)	8.06	7.90	8.45	10.07	11.84	9.35
Visual Considerations:						
• Number of homes from which transmission line is seen as a prominent visual intrusion[1]	87	16	24	23	17	62
• Number of homes from which transmission line is seen as an evident visual intrusion[2]	276	176	192	138	11	85
• Number of poles seen as a prominent visual intrusion[1] from open space areas	0	2	2	38	38	46
• Number of poles seen as an evident visual intrusion[2] from open space areas	14	7	7	21	21	4
• Number of poles seen as a prominent visual intrusion[1] from major public arterials	19	9	0	0	0	0
• Number of poles seen as an evident visual intrusion from major public arterials	34	71	45	4	10	17
• Number of visible prominent multiple deviations within a 3-span \ distance (2000')	3	3	1	2	0	0
Biological Resources:						
• Number of poles located within wetlands	0	1	1	4	3	2
• Length of line crossing over wetlands (mi.)	0.11	0.19	0.13	0.46	0.88	0.27
• Length of line located within native or high-quality successional forest (mi. X 10)	0	0	0	0	0	0
• Length of line located within other woodland (not including street/ residential trees) (mi. X 10)	2.37	2.37	2.37	6.53	7.67	4.36
• Length of line in proximity to sensitive species (with potential for adverse effects)	0	0	0	0	0	0
• Number of crossings of permanent waterways	4	3	5	4	10	5

[1] A prominent visual intrusion is considered to be a feature which is dominant in scale and conflicts with the character of the existing setting in a landscape largely without similar modifications.

[2] An evident visual intrusion is considered to be a feature which is readily visible but not dominant either because of distance/scale or because it is parallel to or replacing an existing transmission or large distribution line.

* Adverse effects to commercial properties include crossing properties at angles rather that along property/land lines, or passing with 100' of commercial buildings affecting their ability to expand (except along highway frontages where zoning requires a highway setback).

The table below illustrates the differences in the overhead and underground construction costs, including engineering, in millions of dollars. Differences in the two routes were due to a combination of differing distances, private vs. public right-of-way, and assumptions made about boring vs. conventional trenching.

	Mahan Route	Buck Lake Route
Overhead Construction	$2.6 M	$3.3 M
Underground Construction	$31.1 M	$24.7 M

As this table illustrates, the differences between conventional overhead construction and undergrounding range from 21.4 million to 28.5 million.

Just as there are substantial cost differences, there are important land use and environmental differences as well. It is generally felt that undergrounding reduces or eliminates the impacts associated with overhead transmission lines. While it is true that undergrounding puts the line out of view, it creates other, less recognized impacts. It also results in greater difficulty in restoring service after a catastrophic failure.

An overhead line can generally span and not disturb sensitive features such as cultural resources sites, streams, most wetlands, isolated steep slopes, a sensitive species location, etc. Undergrounding, however, requires construction of a trench and results in a disturbed area of approximately 40' in width for the entire the length of the line (Photos 1 and 2). In addition, a splice in the line is required approximately every 1500'-2000', which involves the installation of a vault that creates an area of disturbance of approximately 100' in width (Photo 3). Because of the necessity to access the line in the event of a fault, a permanently cleared right-of-way of approximately 30' in width is needed. If a fault does occur in an underground line, it is not readily visible from the surface and can take considerably longer to locate and repair. When identified, this results in a new ground disturbance at whatever place it happens to occur. As a result, undergrounding benefits some issues, such as visual impacts, while often disadvantaging or causing substantially greater impact to others, such as biological, cultural and physical resources.

width of Clear Cutting

Figure 16 is a comparison of the impacts of traditional aboveground construction for the six primary alternative routes, showing the impacts that would occur if these routes were constructed as underground lines. As this table indicates, significantly more ground disturbance would result from underground construction and those resources and features that lay in its path could not be avoided. It would, however, all but eliminate the visual impacts – overhead wires and poles would not be seen, but the width of permanently cleared right-of-way would in itself constitute a visual impact, albeit of substantially lesser consequence.

Line 9A Transmission Line Routing Study

Figure 13. Primary Alternate Routes

Attachment # 5
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Second Public Workshop

A second public workshop was held at the same venue and in the same informal, open house format as the first on April 22, 2003. It was advertised with direct mail notices to residents of the study area, as well as public notices in the *Tallahassee Democrat*, and signs in front of the meetingf location on the day of the workshop.

At this event, the exhibits presented at the first workshop were available as well as enlarged exhibit boards of Figures 9-16 of this report.[1] In addition, a notebook was available that included photographs of underground transmission line construction. The first station included these eight exhibit boards, minus the chart comparing underground and overhead land use and environmental impacts, which was at its own station. Other stations addressed Purpose and Need and Engineering.

At the first station, participants were given an overview of the process and results using these eight boards. From there, they moved about the room visiting with project representatives and reviewing other exhibits. All participants were invited to provide written comment. Of the 81 people attending, 47 provided comments.

Two primary questions were asked on the comment form:

- Which route do you favor?
- What key issues/criteria categories do you think should be considered most important in the selection of a preferred alternative?

Responses to the first question were as follows:

- Route A – 28 responses
- Route E – 2 responses
- Route F – 2 responses
- Route P – 4 responses
- Route T – 8 responses
- Route AD – 6 responses
- Route O – 1 response

[1] It should be noted that at the open-house Route AD was presented instead of Route N as illustrated on Figures 13-16 in this report. The change is due to adjustments in totals in three criteria: length of line in designated open space/parks, length of line affecting trees along major arterials (both in the Public and Commercial Interests criteria category) and in the length of line located within other woodland (in the Biological Resources criteria category). These adjustments gave Route N a one point Rank Order Total advantage over route AD, making route N the best overall route for the West Railroad scenario. The path of these two routes is much the same, differing in the use of Apalachee Parkway (Route AD) vs. Tom Brown Park and the railroad (Route N) on the west, and using Links 17/18 vs. Links 16/5 respectively to make the primary south-north transition on the east.

Another new development that has come to light since the initial analysis and second public meeting is the presence of two previously unknown and undocumented grave yards. Both are north of the J. R. Alford Greenway near the point where Routes P and T diverge. A line following either of these routes would have to be somewhat reoriented to avoid crossing these grave yards but could be relatively easily accomplished based on field measurements taken to document their general location.

When considered in terms of general routing scenarios, 28 (54%) favored the Mahan Drive route for some distance, 8% favored the use of the Buck Lake Road/Mahan Drive combination routes for some distance, and 37% favored the use of the railroad routes for some distance.

Responses to the second question were as follows (combination of "Most Important" and "Highly Important"):

- Residential Properties – 39 responses
- Visual Considerations – 24 responses
- Biological Resources – 16 responses
- Physical Resources – 14 responses
- Public and Commercial Interests – 7 responses

With respect to the routes that scored among the best and worst in these 5 categories is the following (reference Figure 14):

- Residential Properties: Route N scored best, Routes P and T scored second best. None of the routes scored particularly poorly in this respect.
- Visual Considerations: Routes P and T scored best, and Routes E, F and N scored second best. Route A scored worst in this category.
- Biological Resources: Routes A, E and F scored best, and Route N scored second best. Route T scored among the poorer routes in this regard.
- Physical Resources: Routes A and E scored best, and Route F scored second best. Routes P and T scored among the worst.
- Public and Commercial Interests: Route P scored best, while T and N scored second best. Route A scored the worst.

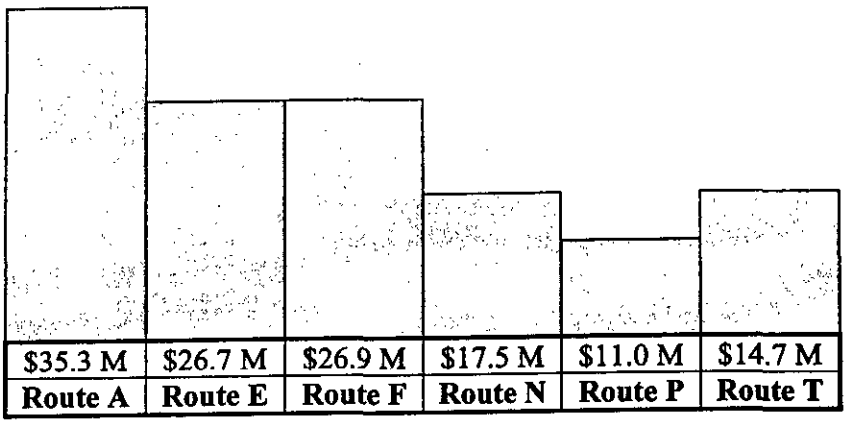
Cost and Engineering

In addition to the technical analysis and public input facilitated by EDAW and EEC, the City provided relative order of magnitude cost data and engineering input for the six primary alternative routes. The chart below illustrates the relative order of magnitude costs for each of the six primary alternative routes in millions of dollars, assuming conventional overhead construction.

$5.4 M	$5.8 M	$6.7 M	$8.9 M	$10.0 M	$12.0 M
Route A	**Route E**	**Route F**	**Route N**	**Route P**	**Route T**

As this chart indicates, Route A is the most economical alternative at approximately $5.4 million, using conventional overhead construction. The costs escalate to as much as $12 million if constructed along Route T; an increase of approximately $6.6 million. Route E, the second lowest in cost, is approximately $400,000 more than Route A. Route F is approximately $1.4 million more than Route A. Cost projections increase noticeably for Routes N and P which are $3.5 million and $4.6 million more respectively than Route A. Route T is the most expensive as noted.

If the portions of these routes located along Mahan Drive or Buck Lake Road were to be undergrounded in order to reduce visibility and impacts to trees, the cost differential would be substantially different in both amount and trend, as illustrated in the following diagram.



$35.3 M	$26.7 M	$26.9 M	$17.5 M	$11.0 M	$14.7 M
Route A	**Route E**	**Route F**	**Route N**	**Route P**	**Route T**

In this case, Route A would become the most expensive route at approximately $35.3 million because of its length along Mahan Drive. Route P, on the other hand, would be the least expensive at approximately $11.0 million. Routes E and F are second highest in cost at approximately $27 million because of their substantial length along both Buck Lake Road and Mahan Drive. Routes N, P, and T all have minimal length along these roads and would therefore be the most cost effective if any substantial portion of the routes along Mahan Drive or Buck Lake Road were to be undergrounded.

The City also provided input on engineering considerations in the form of difficulties that could be anticipated along the various routes. These included the following:

- Building roads along the railroad
- Tight right-of-way conditions
- Property acquisition issues
- Railroad permitting
- Wetland permitting
- Presence of existing distribution lines
- Transmission line in the way
- Railroad inspector during construction
- Tree clearing

The process included dividing each route into line segments. For each line segment, the number of difficulties were counted and then multiplied by the length of line. This total was then summed with the remainder of the totals for all segments of each line. The sum was then divided across the total length of the route to determine an average number of difficulties/mile. Length of line also contributes to ease of construction (i.e., a shorter line means less time of construction). This factor was put on a per unit basis with the shortest line, Route E, being the base. Once this number was calculated, an overall composite score was calculated based on multiplying both factors together.

This analysis resulted in the following breakdown of scores for the six primary alternative routes:

- Route A 2.33
- Route E 2.90
- Route F 2.92
- Route N 3.17
- Route P 3.55
- Route T 3.16

Based on this analysis, Route A scored the best with a composite score of 2.33. Routes E and F scored second best with scores of 2.90 and 2.92 respectively. Routes N and T scored next best with scores of 3.17 and 3.16 respectively. Route P scored worst with a composite score of 3.55.

Recommendations

The direction given by the City was to base the recommendation of this study strictly on the results of the technical studies conducted and the public input received at the two public workshops.

On this basis, the recommendation of this study with regard to the preferred alternative is Route N. Route N is recommended with qualifications on the following basis:

- It scored best or second best with four of the five criteria categories – more than any other.
- It scored best with Residential Properties, the criteria category the public rated as most important.
- It scored poorly only in Physical Resources, a category of much less importance to the public and one whose effects can be largely mitigated through careful design and construction, unlike the other four criteria categories whose impacts are much less able to be mitigated.

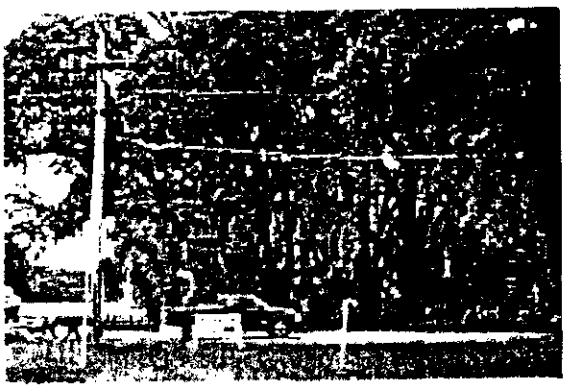


Photo 9

Photo 10

project would not be affected by the highway widening – the effect would be additive. Photo 9 is a view eastward from Pedrick Road of the large trees that line Mahan Drive and would be cut from the right (south) by the transmission line and from the left (north) by the highway expansion. Photo 10 illustrates the highway right-of-way cross section, with the highway and its proposed expansion extending in from the right (north) and the transmission line right-of way extending in from the left (south). Again, the effect is additive.

Because Route A would result in substantially greater impacts to adjacent landowners as well as the community at large, it is the least favored of all routes based on the technical analysis. Given the second choice, therefore, between Routes E and F, Route F would be recommended as the preferred alternative to Route N (if Route N proves unfeasible). This recommendation is based on the fact that Route E impacts both Buck Lake Road and Mahan Drive – which, while they differ somewhat in character, are both important arterials with substantial numbers of adjacent homes. A substantial portion of Route E runs along Mahan Drive where it would result in tree removal as noted, while a route along Buck Lake Road would involve far fewer trees and result primarily in tree trimming rather than removal as it would along Mahan Drive. This route adds impacts to each arterial and the adjacent land uses without minimizing effects to either.

Route F has a cost of $6.7 million ($2.2 million less than Route N, and $1.3 million more than Route A) while Route E has a cost of $5.8 million ($3.1 million less than Route N, and $0.4 million more than Route A) assuming conventional overhead construction. These routes scored nearly equally (2.92 and 2.90 respectively) for engineering constraints compared to a score of 3.17 for Route N and 2.33 for Route A.

Photo 11

If Route F were to be used for this line, it is recommended that the existing distribution line be buried and the new poles treated with a dark color. This would result in far fewer poles than are now present and would substantially reduce their visibility (see Photo 11). As proposed with a line on Buck Lake Road (or anywhere the

transmission line would follow an existing distribution line), every other pole would be removed and a new transmission pole would be put in its place with the existing distribution lines underbuilt on the transmission poles. By putting the distribution underground and building the transmission in its place, the landscape along Buck Lake Road would be little degraded and, it could be argued, would be improved by reducing the number of poles by half or more.

Darkening the poles would further reduce their visibility (Photo 12). This is a measure that would greatly benefit the visibility of the line regardless of which line is ultimately constructed.

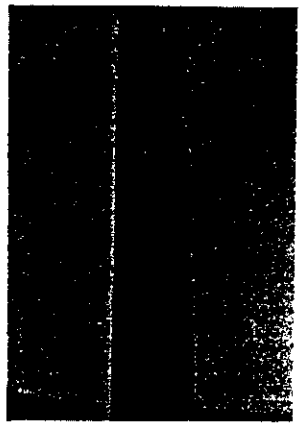


Photo 12

Undergrounding of distribution lines has neither the significant cost nor environmental disadvantages that undergrounding transmission of this voltage has. It would also be very feasible and cost effective to order the poles with a darkened finish, which would substantially reduce their visibility against the largely wooded background.

For the above reasons, Route N is recommended as the preferred route. If this route is shown to be unfeasible, Route F is recommended as the route to carry forward for approval.

- It follows a scenario (railroad right-of-way) generally identified as preferable to a substantial portion of the public (37%) (Photos 4 and 5).

Photo 4

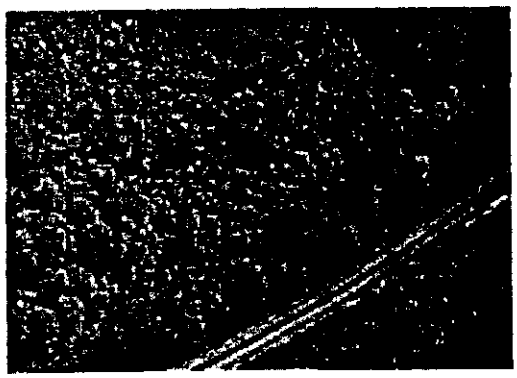


Photo 5

Route N is recommended with qualifications in regard to the ability of the City to come to an acceptable agreement with the CSX Railroad. As a first step, the railroad would have to "determine if there are any known plans or physical constraints that would impede or disallow the proposed project." Beyond this, it is possible there would be conditions of an agreement that would prove to be unacceptable to the City from a financial or liability standpoint. Either of these could preclude the ability of the City to use this route or any of the three primary alternative routes using the railroad (P, T or N).

Additional issues that would need to be resolved with respect to this line include its proximity to (and presence on) the J.R. Alford Greenway. (Photo 6 is facing the western edge of the greenway along which the alignment of Route N passes – in front of the large trees at the edge of the property). This is land donated to the state and now managed by the County in accordance with strict guidelines established by the state. This land contains important biological resources as well as another significantly rare commodity – a large block of public land. The sensitive biological and cultural resources present on this property would have to be carefully surveyed to assure avoidance of these important resources. Because this line would be located along the far western edge of the property adjacent to residential developments, the chances of impacting such sensitive resources are low. However, the county and state agencies responsible for the management of this property view a route anywhere in the property as a significant issue.

Photo 6

With regard to cost and engineering, Route N is near the mid point in costs of the six primary alternative routes at $8.9 million assuming conventional overhead construction. If underground construction is used along all or portions of Mahan Drive or Buck Lake Road, Route N would score much more favorably in comparison due to the relatively minor amount of line along these

arterials. It scored somewhat more poorly than the median on engineering constraints with a score of 3.17, again, on the basis of overhead construction.

If this route proves to be unavailable for these or any other reasons, the recommended route would then be either Route E or Route F. While the public indicated a strong preference for Alternative A, it rated poorly on two counts: worst Total Rank Order score (worst overall compatibility with the criteria), and worst in two criteria categories: Public and Commercial Interests, and Visual Considerations – the latter being one of the most important categories to the public. In this regard, Route A would significantly impact views from 363 homes. By comparison, Route E would similarly impact 192 homes and Route F would impact 216 homes.

On cost and engineering, Route A scored best of all the primary alternative routes with a cost of $5.4 million, assuming conventional overhead construction. If undergrounding were to be done along all or part of the line, Route A would score substantially poorer relative to the other routes under consideration. Route A also scored best of the six routes for engineering constraints with a score of 2.33.

With regard to broader community interests, Route A would result in much greater impact to trees along major arterials: 3.18 miles, which translates to 160 trees of greater than 18" in diameter that would have to be removed along Mahan Drive. Photo 7 is a view along Mahan Drive; and Photo 8 is a view down the existing distribution line right-of-way, which is located at the far edge of the highway right-of-way.

Photo 7

The 1.73 miles of trees impacted along Buck Lake Road for Route F would involve primarily trimming. Again, from the broader public perspective, Route A would be seen as a greater visual intrusion from a major arterial and from public open space areas than Route F. It would also substantially impact more commercial development. In those criteria categories, it does best in – Physical Resources and Biological Resources – Route A has little meaningful advantage over Routes E and F. There is similarly little to distinguish it from Routes E and F in the category of Residential Properties.

Photo 8

The reason expressed most frequently by the public who favored Alternative A is that widening Mahan Drive would in itself result in the removal of most of the trees along this route. In reality, this widening would not reach the area of the proposed transmission line alignment, which currently runs at the far edge of the highway right-of-way. The great majority of the 160 trees that would be removed as a result of the transmission line